a4 cont

and said second input shaft, when conducting gear-shift through change-over of said gear trains by means of said claw clutch.

Please ADD Claim 9 as follows:

a5

9. A power transmission apparatus, as described in claim 2, wherein either one of said first motor or said second motor is driven so that wear-out of said claw clutch is suppressed by controlling either one of said first input shaft and said second input shaft, when conducting gear-shift through change-over of said gear trains by means of said claw clutch.

(A copy of the marked-up version of amended Claim 3 is attached to this Preliminary Amendment).

REMARKS

Entry of the amendments to the specification and claim before examination of the application is respectfully requested. These claims have been amended to remove multiple dependencies/These claims patentably define over the art of record.

If there are any questions regarding this Preliminary Amendment or this application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect

a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Crowell and Moring L.L.P., Deposit Account No. 05-1323 (Docket No. 381NP/50859).

Respectfully submitted,

Date: February 28, 2002

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JFM/lw

VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE SPECIFICATION

[0047] First of all, into a power train control unit 50 shown in the Fig. 1 are inputted a depression amount "α" of an acceleration pedal, a depression force "β" of an brake pedal, the position of a shift lever "Ii", the battery capacity "Vb" detected from a battery 49, an engine rotating speed "Ne" detected by the engine rotating speed sensor 44 mentioned above, a rotating speed "Ni1" of the first input shaft detected by the sensor 45 mentioned above, a rotating speed "Ni2" of the second input shaft detected by the sensor 46 mentioned above, and an output shaft rotating speed "No" detected by the sensor 47 mentioned above. And, in the power train control unit 50 mentioned above, the torque of the engine 1 is calculated, and is sent or transmitted to an engine control unit 51 through LAN as a communication means. In the engine control unit 51, an opening angle of the throttle valve, an amount of fuel and the ignition timing are calculated out for accomplishing the torque of the engine 1 transmitted, thereby to control the actuators thereof, respectively. With the motor control unit 52 mentioned above, the battery 49 is charged up with the electric power obtained from the first motor 29 and the second motor 30, and/or the electric power is supplied from the battery 49, so as to drive the first motor 29, the second motor 30, the stepping motor 53, the DC motor (1) 54, and the DC motor (2) 55, etc. In the Fig. 2, within the power train control unit 50, first of all a vehicle speed "Vsp" is calculated out from the output shaft rotating speed "No" by a function "f" in a [sep] step 201.

Next, in a step 202, a target drive shaft torque "TTqOut", at which a driver aims to, is calculated out from the vehicle speed "Vsp", the acceleration pedal depression amount "α", the brake pedal depression force "β", and the shift lever position "Ii". And, in a step 203, a gear-shift command (or shift command) "Ss" is calculated out from the above-mentioned target drive shaft torque "TTqOut" and the vehicle speed "Vsp", thereby selecting a predetermined step in transmission. Finally in a step 204, from the above-mentioned target drive shaft torque "TTqOut", the vehicle speed "Vsp", the battery capacity "Vb", the engine rotating speed (or engine speed) "Ne", and the first input shaft rotation speed "Ni1" and the second input shaft rotating speed "Ni2", the torque for each actuator (i.e., the engine torque "Te", the first motor torque "Tm1", the second motor torque "Tm2", and each the DC motor toque) and the number of steps of each the stepping motor are calculated out, and are outputted.

[0054] The parallel mode in Fig. 8 is a mode where any one of the first motor 29 or the second motor 30 is driven to assist the acceleration with an output discharging from the battery 49 during traveling with the driving power of the engine 1, thereby improving the driving performance or drivability of the car. First, explanation will be made on a case where the car is traveling with the driving power of the engine 1 while setting the transmission ratio of the gear-type transmission 100 at the 1st speed. The first friction clutch 25 is closed while the second friction clutch 26 released, and the hub sleeve 3 is directly connected

to the gear 31 while the hub sleeve 9 in the neutral condition. In this instance, the torque transmission route of the engine 1 is, as indicated by the solid line in the figure: i.e., the engine output shaft 19 → the gear 20 → the gear 21 → the first friction clutch 25 → the first input shaft 23 → the hub sleeve 3 → the gear 31 → the gear 32 → the output shaft 27. Under this condition, in a case where the target drive shaft torque "TTqOut" comes to be large due to depression of the acceleration pedal by the driver, since there occurs a response delay a little bit on the torque of the engine 1, therefore it is preferable to provide an acceleration assist by means of the driving power of a motor having a relatively small response delay. In a case where the first motor 29 is driven by the output discharging from the battery 49, the torque transmission route of the first motor 29 is, as indicated by the dotted line in the figure: i.e., the first input shaft 23 → the hub sleeve 3 → the gear 31 → the gear 32 → the output shaft 27, therefore it is possible to obtain the acceleration assist. Also, by connecting the hub sleeve 6 to the gear 33 directly, or connecting the hub sleeve 14 to the gear 37 or 41 directly, it is possible to drive the second motor 30, so as to achieve the acceleration assist. In a case where the hub sleeve 6 is directly connected to the gear 33, the torque transmission route of the second motor 30 is, as indicated by the one-dotted chain line in the figure: i.e., the second input shaft 24 → the hub sleeve 6 → the gear 33 → the gear 34 → the output shaft 27. Further, the parallel mode mentioned above can be achieved also in the case where the car is running with the driving power of the engine 1, wherein the hub sleeve 3 is in

the neutral condition while the hub sleeve 9 is directly connected to the gear 35 or 39, so as to set the transmission ratio at the 3rd speed or the 5th speed, thereby traveling with the driving power of the engine 1. And also, when achieving the acceleration assist by means of only the first motor 29, it is preferable to reduce the fuel consumption of the engine and the electric power consumption of the battery by setting both the hub sleeves 6 and 14 in the neutral condition, thereby cutting off the second motor 30. Next, explanation will be made on the case (not shown in the figure) where the transmission ratio of the gear-type transmission 100 is set at the 2nd speed, thereby traveling with the driving power of the engine 1. The first friction clutch 25 is released while the second friction clutch 26 closed, and the hub sleeve 6 is directly connected to the gear 33 while the hub sleeve 14 in the neutral condition. In this instance, the torque transmission route of the engine 1 is: i.e., the engine output shaft 19 → the gear 20 → the gear 22 → the second friction clutch 26 → the second input shaft 24 → the hub sleeve 6 → the gear 33 → the gear 34 → the output shaft 27. Under this condition, in a case where the target drive shaft torque "TTqOut" comes to be large due to depression of the acceleration pedal by the driver, since there occurs a response delay a little bit on the torque of the engine 1, therefore it is preferable to provide an acceleration assist by means of the driving power of a motor having a relatively small response delay. In a case where the second motor 30 is driven by the output discharged by the battery 49, the torque transmission route of the first motor 29 is: i.e., the second input shaft 24 → the hub sleeve 6 → the gear 33 →

the gear 34 → the output shaft 27, therefore it is possible to obtain the acceleration assist. Also, with connecting the hub sleeve 3 to the gear 31 directly, or connecting the hub sleeve 9 to the gear 35 or 39 directly, it is possible to drive the first motor 29, so as to achieve the acceleration assist. In a case where the hub sleeve 3 is directly connected to the gear 31, the torque transmission route of the first motor 29 is: i.e., the first input shaft 23 → the hub sleeve 3 → the gear 31 → the gear 32 → the output shaft 27. Further, the parallel mode mentioned above can be achieved also in the case where the car is running with the driving power of the engine 1, wherein the hub sleeve 6 is in the neutral condition while the hub sleeve 14 is directly connected with the gear 37 or 41, so as to set the transmission ratio at the 4^{th} speed or the 6^{th} speed. And also, when achieving the acceleration assist by means of only the second motor 30, it is preferable to reduce the fuel consumption of the engine and the electric power consumption of the battery, by bringing both the hub sleeves 3 and 9 in the neutral condition, thereby to [cutt] cut off the first motor 29.

[0055] Fig. 10 shows a method for accomplishing the series/parallel common mode mentioned above, but upon the operation principle, which is different from that shown in the Fig. 9. First, explanation will be made on a case where the car is running with the driving power of the engine 1, wherein the transmission ratio of the gear-type transmission 100 is set at the 1^{st} speed. The first friction clutch 25 is closed while the second friction clutch 26 released, and the hub sleeve 3 is

directly connected to the gear 31 while the hub sleeve 9 in the neutral condition. In this instance, the torque transmission route of the engine 1 is, as shown by the solid line in the figure: i.e., the engine output shaft 19 → the gear 20 → the gear 21 → the first friction clutch 25 → the first input shaft 23 → the hub sleeve 3 → the gear 31 → the gear 32 → the output shaft 27. Further, when driving the second motor 30 to generate electricity therefrom, a portion of the motive power of the engine 1 transferred onto the output shaft 27 is transmitted on the route, as shown by the one-dotted chain line in the figure: i.e., the gear 34 → the gear 33 → the second input shaft 24 → the second motor 30, therefore it is possible to drive the first motor 29, so as to achieve the acceleration assist, with using the output of electric power generation from the second motor 30. In this instance, the torque transmission route of the first motor 29 is: i.e., the first input shaft 23 → the hub sleeve 3 → the gear 31 → the gear 32 → the output shaft 27. Further, the series/parallel mode mentioned above can be achieved also in the case where the hub sleeve 3 is in the neutral condition while the hub sleeve 9 is directly connected to the gear 35 or 39, so as to set the transmission ratio of the gear-type transmission 100 at the 3^{rd} speed or the 5^{th} speed, and it may be also possible to drive the second motor 30, so as to generate electricity therefrom, by bringing the hub sleeve 6 in the neutral condition while connecting the hub sleeve 14 to the gear 37 or 41 directly. Next, explanation will be made on a case (not shown in the figure) where the transmission ratio of the gear-type transmission 100 is set at the 2^{nd} speed, thereby running or [teraveling] traveling the car with the driving

power of the engine 1. The first friction clutch 25 is released while the second friction clutch 26 closed, and the hub sleeve 3 is directly connected to the gear 31 while the hub sleeve 9 in the neutral condition. Also, the hub sleeve 6 is directly connected to the gear 33, while the hub sleeve 14 in the neutral condition. In this instance, the torque transmission route of the engine 1 is: i.e., the engine output shaft 19 → the gear 20 → the gear 22 → the second friction clutch 26 → the second input shaft 24 → the hub sleeve 6 → the gear 33 → the gear 34 → the output shaft 27. Further, when driving the second motor 30 to generate electricity therefrom, a portion of the motive power of the engine 1 transferred onto the output shaft 27 is transmitted on the route: i.e., the gear 32 → the gear 31 → the first input shaft 23 → the first motor 29, therefore it is possible to drive the second motor 30 with using an output of electric power generation from the first motor 29, thereby to achieve the acceleration assist. In this instance, the torque transmission route of the second motor 30 is: i.e., the second input shaft 24 → the hub sleeve 6 → the gear 33 → the gear 34 → the output shaft 27. Further, the series/parallel mode mentioned above can be achieved also in the case where the hub sleeve 6 is brought in the neutral condition while the hub sleeve 14 is directly connected to the gear 37 or 41, so as to set the transmission ratio of the gear-type transmission 100 at the 4th speed or the 6th speed, and it may be also possible to drive the first motor 29, so as to generate electricity therefrom, by bringing the hub sleeve 6 in the neutral condition while connecting the hub sleeve 14 to the gear 37 or 41 directly.

Please AMEND Claim 3 as follows:

3. A power transmission apparatus, as described in [either one of the claims] <u>claim</u> 1 [and 2], wherein either one of said first motor or said second motor is driven so that wear-out of said claw clutch is suppressed by controlling either one of said first input shaft and said second input shaft, when conducting gear-shift through change-over of said gear trains by means of said claw clutch.